COSEWIC
Status Appraisal Summary

on the

Blue Whale
Balaenoptera musculus

Pacific population

in Canada

ENDANGERED
2012

COSEWIC
Committee on the Status
of Endangered Wildlife
in Canada

COSEPAC
Comité sur la situation
des espèces en péril
au Canada

COSEWIC status appraisal summaries are working documents used in assigning the status of wildlife species suspected of being at risk in Canada. This document may be cited as follows:

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COSEWIC
Assessment Summary

Assessment Summary – May 2012

Common name
Blue Whale - Pacific population

Scientific name
Balaenoptera musculus

Status
Endangered

Reason for designation
Individuals off the coast of British Columbia are likely part of a northeastern Pacific population that was depleted by whaling. The infrequency of observations (visual and acoustic) suggests their numbers are currently very low (significantly less than 250 mature individuals). Threats to this species along the coast of British Columbia are poorly known, but may include ship strikes, anthropogenic noise, entanglement in fishing gear, and long-term changes in climate (which could affect the abundance of their zooplankton prey).

Occurrence
Pacific Ocean

Status history
The species was considered a single unit and designated Special Concern in April 1983. Split into two populations in May 2002. The Pacific population was designated Endangered in May 2002. Status re-examined and confirmed in May 2012.

COSEWIC
Status Appraisal Summary

Balaenoptera musculus
Blue Whale (Pacific population) Rorqual bleu (Population du Pacifique)
Jurisdictions: Pacific Ocean

Current COSEWIC Assessment:

Status category:
☐ XT ☒ E ☐ T ☐ SC

Date of last assessment: May 2002

Reason for designation at last assessment: Blue Whales off the coast of British Columbia are likely part of a population based in the northeastern Pacific. The population was reduced by whaling. The rarity of sightings (visual and acoustic) suggests their numbers are currently very low (significantly less than 250 mature individuals). Threats for Blue Whales along the coast of British Columbia are unknown, but may include ship strikes, pollution, entanglement in fishing gear, and long-term changes in climate (which could affect the abundance of their zooplankton prey).

New reason for designation (only if different from above): Individuals off the coast of British Columbia are likely part of a northeastern Pacific population that was depleted by whaling. The infrequency of observations (visual and acoustic) suggests their numbers are currently very low (significantly less than 250 mature individuals). Threats to this species along the coast of British Columbia are poorly known, but may include ship strikes, anthropogenic noise, entanglement in fishing gear, and long-term changes in climate (which could affect the abundance of their zooplankton prey).

Criteria applied at last assessment: D1

If earlier version of criteria was applied[1], provide correspondence to current criteria: Not Applicable

If different criteria are proposed based on new information, provide explanation: A2abd; D1.

A2abd. Commercial whaling from coastal whaling stations during 1908 to 1965 killed at least 1378 Blue Whales in British Columbia waters. This, together with coastal and offshore whaling on this population elsewhere in the North Pacific, reduced the population substantially, and the infrequency of sightings in recent years suggests minimal recovery has taken place. Meets Endangered under A2abd as over the past 3 generations (i.e. since ca. 1915) there has been a suspected decline of more than 50% in the total number of mature individuals based on the low numbers of individuals observed in recent surveys (a), the difficulty whalers had in finding and catching Blue Whales (preferred targets) in the last years of commercial whaling (b), and high levels of historic commercial exploitation (d). The cause of the reduction (commercial whaling) has ceased and is understood but the reduction may not be reversible.

D1. Meets Endangered under D1 as the number of mature animals is likely less than 250.

If application of current specific criteria is not possible, provide explanation: Not applicable

[1] An earlier version of the quantitative criteria was used by COSEWIC from October 1999 to May 2001 and is available on the COSEWIC website: http://www.cosewic.gc.ca/eng/sct0/original_criteria_e.cfm

Recommendation: Update to the status report NOT required (wildlife species' status category remains unchanged)

Reason:

☒sufficient information to conclude there has been no change in status category

☐not enough additional information available to warrant a fully updated status report

Evidence (indicate as applicable):

Wildlife species:

Change in eligibility, taxonomy or designatable units: yes ☐ no ☒

Explanation:

There is no new information to indicate that the taxonomic or DU status of the Blue Whale Pacific population has changed.

Range:

Change in Extent of Occurrence (EO): yes ☐ no ☐ unk ☒
Change in Area of Occupancy (AO): yes ☐ no ☐ unk ☒
Change in number of known or inferred current locations: yes ☐ no ☐ unk ☒
Significant new survey information: yes ☒ no ☐

Explanation:

Prior to the last status assessment in 2002, there had been minimal survey effort for this species in Pacific waters of Canada. Since then, dedicated shipboard cetacean surveys have been undertaken by DFO each year during 2002-08. These confirmed the rarity of Blue Whales in the region, as only six sightings were made in over 28,000 km of transect survey effort (Ford *et al.* 2010a). All sightings were near the continental shelf break to the south and southwest of Haida Gwaii (formerly Queen Charlotte Islands), which is one of the areas where numerous Blue Whales were taken during the whaling period in BC. Williams and Thomas (2007) undertook vessel-based cetacean surveys of coastal waters of BC in 2004 and 2005 and did not observe Blue Whales in 4400 km of survey effort. Acoustic monitoring with a fixed hydrophone array off northwestern Vancouver Island revealed regular but low levels of Blue Whale calling during August-March, 1994-2000 (Burtenshaw *et al.* 2004).

Population Information:

Change in number of mature individuals: yes ☐ no ☐ unk ☒
Change in total population trend: yes ☐ no ☐ unk ☒
Change in severity of population fragmentation: yes ☐ no ☒ unk ☐
Change in trend in area and/or quality of habitat: yes ☐ no ☐ unk ☒
Significant new survey information: yes ☒ no ☐

Explanation:

There is growing evidence that Blue Whales found off the coast of British Columbia are part of a population that occurs off southern California and Baja California and in the eastern tropical Pacific. Call types of Blue Whales recorded off British Columbia are typical of the northeastern Pacific population and the same as those produced by Blue Whales in California (Burtenshaw *et al.* 2004; Ford *et al.* 2010b). Of 10 Blue Whales photographically identified off the BC coast, 3 matched to the California population (Calambokidis *et al.* 2009). Line-transect vessel surveys and photo-identification surveys of the California population in the 1990s both resulted in abundance estimates of approximately 2000 individuals (Calambokidis and Barlow 2004). Since the late 1990s, abundance estimates from line-transect surveys off the US west coast have declined to 500-600, while photo-identification abundance estimates have increased to 2500 (Calambokidis 2009). This discrepancy is thought to be due to a redistribution of animals to offshore and northern waters outside the line-

transect survey area (Barlow and Forney 2007). Calambokidis *et al.* (2009) suggested that a shift in the range of the California population to more northerly foraging areas, including waters off British Columbia and in the Gulf of Alaska, may take place during years of 'cool' conditions related to the Pacific Decadal Oscillation (PDO). The PDO entered a cool regime around 1998. In the 2002 status report, the California population was considered likely to be increasing though no quantitative data were available. Calambokidis (2009) made inter-year Peterson mark-recapture estimates based on photo-identification data in adjacent years during 1992-2008 and found a significant but modest increasing trend of less than 3% per annum off the US west coast.

Although the abundance of Blue Whales off southern California is substantial and increasing, sightings in Canadian waters remain very rare despite considerable survey effort during the past decade (see Range section, above). The number of animals using Canadian waters is unknown, but it is likely well below 250 mature individuals. There are no new data on trends in habitat quality.

Threats:

Change in nature and/or severity of threats: yes ☐ no ☐ unk ☒

Explanation:

Threats identified in the 2002 status report include disturbance from increasing whale watch (tourism) activity, ship strikes, entanglement in fishing gear, and pollution. There is no indication that the nature or severity of these threats has changed over the past decade, with the possible exception of ship strikes. A recent assessment of the incidence of ship strikes involving Blue Whales off southern California suggests that this is a more significant source of mortality than previously thought, and that the frequency of ship strikes is increasing (Berman-Kowalewski *et al.* 2010). The frequency of ship strikes of large whales off Washington State also appears to have increased in recent years, though Blue Whales have not yet been documented as having been involved in such incidents (Douglas *et al.* 2008). There are no records of ship strikes of Blue Whales in Pacific Canadian waters.

Fisheries and Oceans Canada's Recovery Strategy for Blue, Fin, and Sei Whales in Pacific Canadian waters (Gregr *et al.* 2006) considers ship strikes, chronic noise from shipping, and acute noise from low frequency active sonar and seismic exploration (e.g., Di Iorio and Clark 2010) to be potentially the greatest current threats to these species. Blue Whales are not thought to be in great danger of entanglement in fishing gear or to be seriously threatened by pollution. As indicated above (Population Information), there is potential for changes in ocean conditions (PDO) to cause shifts in Blue Whale distribution, and this could influence numbers in Canadian waters.

The threats indicated previously and at present can only be regarded as potential threats. There is no clear evidence that any is currently threatening or preventing the recovery of Blue Whales in BC waters.

Protection:

Change in effective protection: yes ☐ no ☒

Explanation:

The Blue Whale (Pacific population) was listed as Endangered under SARA in 2005 but there is no clear evidence that this has led to any change in effective protection.

Rescue Effect:

Evidence of rescue effect: yes ☒ no ☐

Explanation:

Photo-identification matches indicate at least some Blue Whales in Canadian waters are members of the population found off southern California. The California population is large (~2500 individuals, presumably all ages) and slowly increasing. However, to date there is no evidence of an increase in the number of animals in BC waters that could be interpreted to mean rescue is occurring.

Quantitative Analysis:

Change in estimated probability of extirpation: yes ☐ no ☒ unk ☐

Details:

No quantitative analysis is available.

Summary and Additional Considerations:

A Recovery Strategy for Blue Whales in Pacific Canada was finalized and published in June 2006. It identifies a recovery goal and outlines recovery objectives.

List of authorities contacted to review the status appraisal:

*Denotes that information was provided by authority contacted.

Marine Mammal SSC members

John Calambokidis, Cascadia Research, Olympia, WA, USA; contacted April 19, 2011; no additional data; reviewed appraisal summary May 7, 2011

Sources of information:

Barlow, J. and Forney K.A. 2007. Abundance and density of cetaceans in the California Current ecosystem. Fishery Bulletin: 105(4)

Berman-Kowalewski, M., F.M.D. Gulland, S. Wilkin, J. Calambokidis, B. Mate, J. Cordaro, D. Rotstein, J. St. Leger, P. Collins, K. Fahy, and S. Dover. 2010. Association between Blue Whale (*Balaenoptera musculus*) mortality and ship strikes along the California coast. Aquatic Mammals 36: 59-66.

Burtenshaw, J.C., Oleson, E.M., Hildebrand, J.A., McDonald, M.A., Andrew, R.K., Howe, B.M., and Mercer, J.A. 2004. Acoustic and satellite remote sensing of blue whale seasonality and habitat in the Northeast Pacific. Deep-sea Res., Part II. 51: 967-986.

Calambokidis, J. 2009. Abundance estimates of humpback and Blue Whales off the US West Coast based on mark-recapture of photo-identified individuals through 2008. Report # PSRG-2009-07 to Pacific Scientific Review Group, San Diego, CA 3-5 November 2009.

Calambokidis, J. and J. Barlow. 2004. Abundance of blue and humpback whales in the eastern North Pacific estimated by capture-recapture and line-transect methods. Marine Mammal Science 20(1):63-85.

Calambokidis, J., J. Barlow, J.K.B. Ford, T.E. Chandler, and A.B. Douglas. 2009. Insights into the population structure of Blue Whales in the eastern North Pacific from recent sightings and photographic identifications. Marine Mammal Science 25:816-832.

Di Iorio, L. and C.W. Clark. 2010. Exposure to seismic survey alters Blue Whale acoustic communication. Biology Letters 6:51-54.

Douglas, A.B., J. Calambokidis, S. Raverty, S.J. Jeffries, D.M. Lambourn, and S.A. Norman. 2008. Incidence of ship strikes of large whales in Washington state. Journal of the Marine Biological Association of the United Kingdom 88:1121-1132.

Ford, J.K.B., Abernethy, R.M., Phillips, A.V., Calambokidis, J., Ellis, G.M., and Nichol, L.M. 2010a. Distribution and relative abundance of cetaceans in western Canadian waters from ship surveys, 2002-2008. Can. Tech. Rep. Fish. Aquat. Sci. 2913: v + 51 p.

Ford, J.K.B., Koot, B., Vagle, S., Hall-Patch, N., and Kamitakahara, G. 2010b. Passive acoustic monitoring of large whales in offshore waters of British Columbia. Can. Tech. Rep. Fish. Aquat. Sci. 2898: v + 30 p.

Gregr, E.J., J. Calambokidis, L. Convey, J.K.B. Ford, R.I. Perry, L. Spaven, M. Zacharias. 2006. Recovery Strategy for Blue, Fin, and Sei Whales (*Balaenoptera musculus*, *B. physalus,* and *B. borealis*) in Pacific Canadian Waters. *In* Species at Risk Act Recovery Strategy Series. Vancouver: Fisheries and Oceans Canada. vii + 53 pp.

Williams, R., and L. Thomas. 2007. Distribution and abundance of marine mammals in coastal waters of British Columbia, Canada. Report of the International Whaling Commission 9:15-28.

TECHNICAL SUMMARY

Balaenoptera musculus
Blue Whale (Pacific population) Rorqual bleu (Population du Pacifique)
Range of occurrence in Canada (province/territory/ocean): Pacific Ocean

Demographic Information

Generation time (usually average age of parents in the population; indicate if another method of estimating generation time indicated in the IUCN guidelines (2008) is being used) [gen(r=0) = average age of mothers at pre-disturbance state, as estimated from a simplified Leslie matrix; Taylor *et al.* (2007)]	32 yr
Is there an [observed, inferred, or projected] continuing decline in number of mature individuals?	Unknown
Estimated percent of continuing decline in total number of mature individuals within [5 years or 2 generations]	Unknown
[Observed, estimated, inferred, or suspected] percent [reduction or increase] in total number of mature individuals over the last [10 years, or 3 generations].	>50% decline due to historic whaling
[Projected or suspected] percent [reduction or increase] in total number of mature individuals over the next [10 years, or 3 generations].	Unknown
[Observed, estimated, inferred, or suspected] percent [reduction or increase] in total number of mature individuals over any [10 years, or 3 generations] period, over a time period including both the past and the future.	Unknown
Are the causes of the decline clearly reversible and understood and ceased? *Despite more than 45 years of full protection from deliberate killing, there is no clear evidence of recovery from the depletion caused by commercial whaling.*	Cause (commercial whaling) has ceased but decline may not be reversible.
Are there extreme fluctuations in number of mature individuals?	No

Extent and Occupancy Information

Estimated extent of occurrence	> 20,000 km^2
Index of area of occupancy (IAO) (Always report 2x2 grid value).	> 20,000 km^2
Is the total population severely fragmented?	No
Number of locations*	N/A
Is there an [observed, inferred, or projected] continuing decline in extent of occurrence?	Unknown
Is there an [observed, inferred, or projected] continuing decline in index of area of occupancy?	Unknown
Is there an [observed, inferred, or projected] continuing decline in number of populations?	N/A
Is there an [observed, inferred, or projected] continuing decline in number of locations*?	N/A
Is there an [observed, inferred, or projected] continuing decline in [area, extent and/or quality] of habitat?	Unknown
Are there extreme fluctuations in number of populations?	No
Are there extreme fluctuations in number of locations*?	No
Are there extreme fluctuations in extent of occurrence?	No

* See Definitions and Abbreviations on COSEWIC website and IUCN 2010 for more information on this term.

Are there extreme fluctuations in index of area of occupancy?	No

Number of Mature Individuals (in each population)

Population	N Mature Individuals
Canadian Pacific population	<250
Total	<250

Quantitative Analysis

Probability of extinction in the wild is at least [20% within 20 years or 5 generations, or 10% within 100 years].	No quantitative analysis available

Threats (actual or imminent, to populations or habitats)

Previous COSEWIC report: ship strikes, prey abundance, climate change.

DFO Recovery Strategy (Gregr *et al.* 2006): Ship strikes, chronic (e.g., shipping) and acute (e.g., seismic survey, military sonar) anthropogenic noise, pollution, climate change effects on trophic structure.

None of these identified threats has been shown to be actual or imminent in BC waters.

Rescue Effect (immigration from outside Canada)

Status of outside population(s)? Population size approximately 2,500 in California (all ages), increasing at ~ 3% per annum; status elsewhere in North Pacific unknown.	
Is immigration known or possible?	Yes
Would immigrants be adapted to survive in Canada?	Unknown but likely
Is there sufficient habitat for immigrants in Canada?	Unknown
Is rescue from outside populations likely?	Hard to say

Current Status

COSEWIC: Endangered (May 2012)

Additional Sources of Information:

Gregr, E.J., J. Calambokidis, L. Convey, J.K.B. Ford, R.I. Perry, L. Spaven, M. Zacharias. 2006. Recovery Strategy for Blue, Fin, and Sei Whales (*Balaenoptera musculus*, *B. physalus,* and *B. borealis*) in Pacific Canadian Waters. *In* Species at Risk Act Recovery Strategy Series. Vancouver: Fisheries and Oceans Canada. vii + 53 pp.

Taylor, B.L., Chivers, S.J., Larese, J. and Perrin, W.F. 2007. Generation length and percent mature estimates for IUCN assessments of cetaceans. Southwest Fisheries Science Center, National Marine Fisheries Service, La Jolla Laboratory, Administrative Report LJ-07-01. 18 pp.

Status and Reasons for Designation

Status:	**Alpha-numeric Code:**
Endangered	A2abd; D1
Reasons for Designation: Individuals off the coast of British Columbia are likely part of a northeastern Pacific population that was depleted by whaling. The infrequency of observations (visual and acoustic) suggests their numbers are currently very low (significantly less than 250 mature individuals). Threats to this species along the coast of British Columbia are poorly known, but may include ship strikes, anthropogenic noise, entanglement in fishing gear, and long-term changes in climate (which could affect the abundance of their zooplankton prey).	

Applicability of Criteria

Criterion A (Decline in Total Number of Mature Individuals): Meets Endangered under A2abd as over the past 3 generations (i.e., since ca. 1915) there has been a suspected decline of more than 50% in the total number of mature individuals based on the low numbers of individuals observed in recent surveys (a), the difficulty whalers had in finding and catching Blue Whales (preferred targets) in the last years of commercial whaling (b), and high levels of historic commercial exploitation (d). The cause of the reduction (commercial whaling) has ceased and is understood but the reduction may not be reversible.
Criterion B (Small Distribution Range and Decline or Fluctuation): Not applicable as the extent of occurrence and the index of area of occupancy exceed the thresholds.
Criterion C (Small and Declining Number of Mature Individuals): Not applicable as there is insufficient data to estimate current population trends.
Criterion D (Very Small or Restricted Total Population): Meets Endangered under D1 as the number of mature animals is likely less than 250.
Criterion E (Quantitative Analysis): Not performed.

COSEWIC HISTORY

The Committee on the Status of Endangered Wildlife in Canada (COSEWIC) was created in 1977 as a result of a recommendation at the Federal-Provincial Wildlife Conference held in 1976. It arose from the need for a single, official, scientifically sound, national listing of wildlife species at risk. In 1978, COSEWIC designated its first species and produced its first list of Canadian species at risk. Species designated at meetings of the full committee are added to the list. On June 5, 2003, the *Species at Risk Act* (SARA) was proclaimed. SARA establishes COSEWIC as an advisory body ensuring that species will continue to be assessed under a rigorous and independent scientific process.

COSEWIC MANDATE

The Committee on the Status of Endangered Wildlife in Canada (COSEWIC) assesses the national status of wild species, subspecies, varieties, or other designatable units that are considered to be at risk in Canada. Designations are made on native species for the following taxonomic groups: mammals, birds, reptiles, amphibians, fishes, arthropods, molluscs, vascular plants, mosses, and lichens.

COSEWIC MEMBERSHIP

COSEWIC comprises members from each provincial and territorial government wildlife agency, four federal entities (Canadian Wildlife Service, Parks Canada Agency, Department of Fisheries and Oceans, and the Federal Biodiversity Information Partnership, chaired by the Canadian Museum of Nature), three non-government science members and the co-chairs of the species specialist subcommittees and the Aboriginal Traditional Knowledge subcommittee. The Committee meets to consider status reports on candidate species.

DEFINITIONS
(2012)

Wildlife Species	A species, subspecies, variety, or geographically or genetically distinct population of animal, plant or other organism, other than a bacterium or virus, that is wild by nature and is either native to Canada or has extended its range into Canada without human intervention and has been present in Canada for at least 50 years.
Extinct (X)	A wildlife species that no longer exists.
Extirpated (XT)	A wildlife species no longer existing in the wild in Canada, but occurring elsewhere.
Endangered (E)	A wildlife species facing imminent extirpation or extinction.
Threatened (T)	A wildlife species likely to become endangered if limiting factors are not reversed.
Special Concern (SC)*	A wildlife species that may become a threatened or an endangered species because of a combination of biological characteristics and identified threats.
Not at Risk (NAR)**	A wildlife species that has been evaluated and found to be not at risk of extinction given the current circumstances.
Data Deficient (DD)***	A category that applies when the available information is insufficient (a) to resolve a species' eligibility for assessment or (b) to permit an assessment of the species' risk of extinction.

* Formerly described as "Vulnerable" from 1990 to 1999, or "Rare" prior to 1990.

** Formerly described as "Not In Any Category", or "No Designation Required."

*** Formerly described as "Indeterminate" from 1994 to 1999 or "ISIBD" (insufficient scientific information on which to base a designation) prior to 1994. Definition of the (DD) category revised in 2006.

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